

Appl. No. 10/064,620
Amdt. Dated Dec. 20, 2006
Reply to Final Office Action of October 13, 2006

IN THE DRAWINGS

The attached sheet of drawings includes changes to Fig. 4. This sheet, which includes Fig. 4, replaces the original sheet including Fig. 4.

Attachment: Replacement Sheet

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REMARKS/ARGUMENTS

This Response is responsive to the Final Office Action mailed on October 13, 2006. In the Final Office Action claims 1-8, 10-29 and 31 were rejected.

Claims 1-3, 10-14, 20, 21, 23-29 and 31 were rejected under 35 U.S.C. §103 (a) as being unpatentable over Zanelli et al. (U.S. Patent No. 8,515,657, hereinafter "Zanelli") and McGary (U.S. Patent No. 5,521,634, hereinafter "McGary"). Claims 4 and 7 were rejected under 35 U.S.C. §103 (a) as being unpatentable over Zanelli and McGary further in view of Scorse et al. (U.S. Patent No. 5,128,776, hereinafter "Scorse"). Claims 5, 6, 8 and 22 were rejected under 35 U.S.C. §103 (a) as being unpatentable over Zanelli and McGary and further in view of Ransford et al. (EP 479,563 A2, hereinafter "Ransford"). Claims 15 and 16 were rejected under 35 U.S.C. §103 (a) as being unpatentable over Zanelli and McGary further in view of Flower et al. (U.S. Patent No. 6,351,663, hereinafter "Flower"). Claims 17 and 18 were rejected under 35 U.S.C. §103 (a) as being unpatentable over Zanelli and McGary and further in view of Chui et al. (U.S. Patent No. 5,841,473, hereinafter "Chui"). Claim 19 was rejected under 35 U.S.C. §103 (a) as being unpatentable over Zanelli and McGary and Chui and further in view of Reinsch (U.S. Patent No. 5,134,661, hereinafter "Reinsch").

In this Response, claims 1-5, 12, 14-20, 23-26 and 31 have been amended to recite the subject matter more clearly, claims 10, 11 and 27-29 have been cancelled, and claims 32-38 have been added. No new matter has been added. Claims 1-8, 12-26 and 31-38 remain pending in the application.

Claims define allowable subject matter over the applied art

The independent claims 1, 12, 14, 15, 17, 20, 23, 24, and 31 have been rejected under 35 U.S.C. §103 (a) as being unpatentable at least in view of Zanelli and McGary. Applicant has carefully reviewed the applied references, and respectfully traverses the rejection of independent claims 1, 12, 14, 15, 17, 20, 23, 24 and 31, under 35 U.S.C. §103 (a) as being unpatentable over Zanelli and McGary.

The burden of establishing a prima facie case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a prima facie case, the Examiner must not only show that the combination includes all of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). When prior art references require a selected

Appl. No. 10/064,620
Amdt. Dated Dec. 20, 2006
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combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1598 (Fed. Cir. 1988). Furthermore, if the proposed modification would render the prior art unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984).

Zanelli discloses an ultrasound imaging system in which a catheter is moved relative to static tissues. The catheter location is updated continuously and superimposed on tissue images that are updated less frequently, resulting in real-time or near real-time images of the catheter relative to the tissues. The superimposed images permit medical personnel to perform an angiogram with minimal or no exposure of the patient to dye or x rays. Zanelli emphasizes that the relatively sparse catheter location data can be directly superimposed on the tissue images in much less time than is required to create an image of the catheter and the tissues in order to speed the data processing and provide real-time or near real-time images of the catheter relative to the tissues. Zanelli also emphasizes that the dye may harm the patient. For example, injecting chemicals that may cause sensitivity, or an allergic reaction, directly into the heart of a patient may cause a serious problem and lead to kidney damage. Accordingly, Zanelli displays the catheter position relative to the tissues with minimal or no dye.

McGary describes a narrow band transmission system that selectively compresses data transmitted by a radio frequency transmitter to a radio frequency receiver to reduce the size of the transmitted digital data signals. A reduction unit may selectively compress portions of the data, reduce the resolution of portions of the data, and/or not forward portions of the data to the radio frequency transmitter at all or periodically or only when a target moves outside the current field of view of a video camera.

Claim 1 has been amended to recite "providing a span of interest for an acquired image sequence, wherein the span of interest defines a time sequence and a space sequence in the acquired image sequence that includes analytically relevant information in the acquired image sequence and excludes other information in the acquired image sequence" and "selecting a portion of the acquired image sequence in the span of interest, thereby selecting the analytically relevant information and sacrificing the other information," then compressing and decompressing the portion of the acquired image sequence to obtain an analytically relevant image sequence, and then "displaying the analytically relevant image sequence, thereby displaying the analytically relevant information without displaying the other information." The other independent claims have been amended to recite similar limitations.

Appl. No. 10/064,620
Amdt. Dated Dec. 20, 2006
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Support for the foregoing amendments can be found in the specification. For example, the specification states as follows:

At the next step, decompression is applied (shown by image decompression block 140 in Figure 1) to the compressed image sequence 25 to obtain therefrom an analytically relevant image sequence 40. After decompression, the resulting image maintains the information in the span of interest (both in space and time) intact, but sacrifices the other information. (Page 5, first paragraph, lines 6-11).

Referring to Figure 3, there is shown an exemplary method for selecting a circular region of interest. As shown, a binary mask that encompasses the circular region in the images is defined. Figure 3(a) shows an original x ray angiogram image, Figure 3(b) shows a binary mask defined image, Figure 3(c) shows a reconstructed image (lossless within the defined shape) and Figure 3(d) shows the information that is not considered for encoding. (Page 9, first paragraph, lines 1-6).

For example, in news broadcasting, the important image is of the person on the screen. If the background is deleted, it reduces a lot of data and hence can help compression and transmission of such video in a constrained bandwidth environment. (Paragraph that bridges pages 10 and 11, lines 21-24).

The specification makes clear that the span of interest maintains analytically relevant information in the acquired image sequence and sacrifices other information in the acquired image sequence, and after the analytically relevant information in the span of interest is compressed and decompressed, the analytically relevant information is displayed but the other information is not displayed (see Figure 3(c)).

Zanelli fails to teach or suggest displaying the catheter without displaying the tissues. Instead, the catheter is superimposed on the tissues so that the position of the catheter relative to the tissues can be seen by medical personnel during an angiogram. Although Zanelli discloses filtering the catheter from the tissues to generate the catheter image, the catheter is subsequently superimposed on the tissues before the catheter is displayed. Moreover, even if Zanelli was modified to display the catheter without displaying the tissues, the catheter alone would not provide analytically relevant information since the catheter location relative to the tissues is what is important, and the modification would render Zanelli unsatisfactory for its intended purpose.

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art to modify Zanelli with the teaching of McGary by applying lossless compression to the selected portion. The motivation would have been to reduce the storage requirement while preserving the ability to fully recover important portion (the selected portion) of the image sequence (as afforded by lossless compression)." However, Zanelli is not concerned with storage requirements. Instead, Zanelli seeks to provide real-time or near real-time display of the catheter relative to the tissues. Likewise, McGary is not concerned with storage requirements. Instead, McGary seeks to reduce data size during narrow band radio frequency transmission.

Appl. No. 10/064,820
Amdt. Dated Dec. 20, 2006
Reply to Final Office Action of October 13, 2006

Zanelli modified by McGary might lead to compressing and narrow band radio frequency transmission of the catheter image from a radio frequency transmitter to a radio frequency receiver, then decompressing the catheter image, and then superimposing the catheter image on the tissue image. However, the proposed modification would delay superimposing the catheter image on the tissues image, thereby rendering Zanelli unsatisfactory for its intended purpose. Likewise, it would not make sense to employ narrow band radio frequency transmission of the catheter image in Zanelli since presumably the ultrasound imaging system, the medical personnel and the patient are in close proximity, and thus the motivation for combining Zanelli and McGary does not exist.

According to MPEP 2143.01, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. That is clearly not the case here.

Applicant respectfully submits that irrespective of what the other references of Scorse, Ransford, Flower, Chui, and Reinsch, which have been used in conjunction with Zanelli and McGary to reject select independent claims and dependent claims under 35 U.S.C. §103 (a), disclose, teach or suggest, since the primary references of Zanelli and McGary do not teach, disclose or suggest the specific claims recitations of the independent claims as discussed above, any further combination with Zanelli and McGary will still not yield the above claim recitations.

Applicant respectfully submits that the independent claims 1, 12, 14, 15, 17, 20, 23, 24 and 31 are patentable under 35 U.S.C. §103 (a) and therefore, are allowable. Claims 2-8 depend directly or indirectly from claim 1, claim 13 depends from claim 14, claim 16 depends from claim 15, claims 18 and 19 depend from claim 17, claims 21 and 22 depend from claim 20, and claims 25 and 26 depend from claim 24. These dependent claims are similarly allowable.

In view of the foregoing remarks, Applicant respectfully requests withdrawal of the rejections under 35 U.S.C. §103 (a).

New Claims

Independent claim 32 is allowable for the reasons set forth above for claim 1. In addition, claim 32 recites "the time sequence is based on a dye that is injected and tracked within a subject and increases visibility of blood vessels against surrounding tissues in the acquired image sequence." Zanelli teaches against injecting a subject with dye, and thus says nothing about a span of interest with a time sequence based on a dye, and modifying Zanelli to superimpose the dye on the tissues would render Zanelli unsatisfactory for its intended purpose.

Appl. No. 10/064,620
Amdt. Dated Dec. 20, 2006
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Flower discloses enhancing the clarity of fluorescent dye angiograms using relatively small, highly dye-concentrated boluses and obtaining angiograms as the dye passes through the vasculature of interest. However, Flower says nothing about selecting a portion of an acquired image sequence in a span of interest that defines a time sequence based on the dye (claim 32), much less a time sequence that begins when the dye appears in the acquired image sequence and ends when the dye disappears in the acquired image sequence (claim 33).

The Examiner asserts that "it would have been obvious to one of ordinary skill in the art at the time of the invention to select one time instance when a dye appears and a second time instance when the dye disappears since only images captured during the presence of the dye are useful (as column 1, lines 44-48 of Flower clearly suggests)." The cited text states as follows:

At or about the time of dye injection into the animal, the fundus camera begins capturing images, i.e., angiograms, of the eye at specific time intervals. The angiograms provide a record of the extent of dye movement within the ocular vasculature at each specific time interval. (Col. 1, lines 44-48).

The cited text says nothing about a span of interest for an acquired image sequence in which the span of interest defines a time sequence that begins at or about the time of dye injection. Instead, the acquired image sequence begins at or about the time of dye injection. Thus, the acquired image sequence lacks a span of interest which is confined in time to the appearance of the dye and excludes other information in the acquired image sequence outside the time the dye appears.

Claims 33-38 depend from claim 32. These dependent claims are similarly allowable.

Drawings

Applicant respectfully submits that Fig. 4 is amended to clarify Im12 in the image sequence. A replacement sheet of Fig. 4 is being submitted along with this amendment.

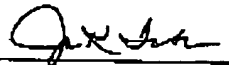
Summary

In view of the foregoing, Applicant respectfully submits that the application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are respectfully requested.

Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact Applicant's undersigned representative at the telephone number below.

Appl. No. 10/064,620
Amdt. Dated Dec. 20, 2006
Reply to Final Office Action of October 13, 2006

Respectfully submitted,

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Attachments: Replacement Sheet 4/4
Request for Continued Examination (RCE) Transmittal